

Unpacking the drivers of adoption of the notion of ecosystem services into conservation policies. New insights from Costa Rica.

Durey, L¹. ; Le Coq, J.F².

¹ Phd Candidate at Jean Monnet-Saint Etienne University. EVS - ISTHME UMR 5600 CNRS.
6, Rue Basse des Rives. 42023 F-Saint-Etienne cedex 02. +33 4 77 42 17 00.

louisdurey@wanadoo.fr

² International center for research in agronomy and development (CIRAD), UMR ART-Dev,
visiting profesor in UNA – CINPE, Heredia, Costa Rica. jean-francois.le_coq@cirad.fr.

Abstract

The notion of ecosystem services benefits from a strong support in international environmental agendas since last decade. Many scholars and experts advocate for mainstreaming it into national State policies, particularly in the conservation sector. However, neither the scientific evidence accumulated nor scholars' efforts to make the notion operational seem successful in influencing policies and their practitioners. This study looks at Costa Rica recent and current developments in adopting the notion of ecosystem services into sound policies in the conservation sector and the specific factors affecting this process. We looked at specific literature, documents and we undertook a series of qualitative interviews with civil servants and key individuals involved in conservation policies. We found that the adoption of ecosystem services notion remains sparse and disaggregated and follows the simultaneous influence of a conjuncture of cognitive, institutional, historic, juridical and cultural factors in a highly dynamic fashion. Our results suggest that scholars aiming at facilitating ecosystem services integration into specific policies should pay more attention to their context.

Key-words: Conservation; Ecosystem Services; Governance; Institutionnalization; Science-Policy Interface.

JEL code Q28 - Renewable Resources and Conservation; Environmental Management – government policy.

1. Introduction: conservation policies and ES, the missing link

The notion of ecosystem service¹ has been successfully adopted in environmental governance agendas since 2005, supported at international level by the convention for biological diversity (CBD) and the Millennium Ecosystem Assessment (MA) (Carmona et al 2012). Progress has been made to overcome the ambiguities of this notion by developing clear typologies (Fisher et al 2008) of its content and by distinguishing its scope in relation to the concept of environmental service (Pesche et al 2013). The wide adoption of ecosystem services by researchers is the cornerstone of a new paradigm of ecosystem management (Seppelt et al 2011). This creates new challenges for sustainability science, such as the need to generate integrative understanding in the way ecosystem services contribute to the dynamics of socioecological systems (Carpenter et al 2009).

Furthermore, one particular point of attention for scientist relies on how those advances in science and international agendas can be incorporated into innovative institutions for governing the nature and biodiversity (Ranganathan et al 2008). The way ecosystem services can be incorporated into public policies and instruments for conserving biodiversity constitutes a new promising research field (Kremen et al 2005). Indeed, there is an important potential lying under the notion of ecosystem services in reconciling socioeconomic and biodiversity conservation rationales if used for framing sounded public policies in a holistic fashion (Seppelt et al 2011). This process has to include all the actors. Ruhl et al (2007) underlines the primary role States have to play in designing new institutions, whereas Daily et al (2008) points the importance of making the world leaders recognize and mainstream the notion of ecosystem services. This also generates practical questions at implementation level. One particular emphasis is how to successfully integrate ecosystem services into a whole landscape approach for planning land use and choosing most suitable sites for conserving biodiversity (De Groot et al 2010, Naidoo et al 2008).

Some tremendous progress has been already accomplished by scientists in designing standard models and methods to assess ecosystem services delivered by landscapes (e.g. Egoh et al 2007, Egoh et al 2008, De Groot et al 2002, Fisher et al 2009), some of them making particular applications in protected areas (e.g. Chan et al 2006, Schirpke et al 2014). In an

¹ In this article we make a distinction between the notions of ecosystem service and environmental service, which despite their close meaning carry a different genesis and sociopolitical use (Pesche et al, 2013).

attempt to vulgarize this knowledge, scientists also develop operational tools and frameworks to perform more comprehensive ecosystem management for state authorities (see Kenneth et al 2013).

However, despite those advances, there is a persistent gap lying between ecosystem services knowledge generated by scientists and the institutions managed by practitioners for governing conservation. Thompson et al (2011) laments the lack of penetrability of the topic of biodiversity and its related ecosystem services across the different sectors involved in land use planning. In addition, scholars point the lack of certainty on how biodiversity is exactly related to ecosystem services (Thompson et al 2011, Daily et al 2008). Existing methods for accounting ecosystem services are still very diverse too (Seppelt et al 2011). Yet, researchers report the design and implementation of several policy instruments by practitioners intended to improve ecosystem services and human well despite the lack of grounded evidence (Carpenter et al 2009). This suggests that policy makers and their practices relating to the adoption of ecosystem services approaches are driven by complex factors that don't necessarily reduce to scientific evidence on ecosystem services generation, as summarized in Laurans and Mermet (2014).

Costa Rica has been very proactive since the last decade in designing payments for environmental services in its forestry sector and this experience has already been well documented (e.g. Pagiola 2008, Fletcher et al 2012, Le Coq et al 2012, Matulis 2013). On the other side, Costa Rica presents a very historically important sector of conservation (Evans 1999, Steinberg 2001). One big success lies in its large network of protected area covering more than 28% of the country's surface (SINAC, 2007). Advances have been made in valuating ecosystem services generated by protected areas with particular emphasis on ecotourism and willingness-to-pay (e.g. Chase et al 1998, Hearne et al 2002, Echeverria et al 1995 or Lindberg and Aylward 1999). However, the genesis of ecosystem services related instruments in this conservation sector offers a rich empirical field which to our knowledge has yet to be researched.

Ahead of Daily et al (2008)'s call to take stock of the variety of attempts to incorporate ecosystem services into institutional structures, we aim in this article at assessing the factors influencing the institutionalization of the notion of ecosystem services in the sphere of conservation in Costa Rica. For that, we take up the conservation sector in Costa Rica

embracing laws, policy instruments and government bodies and determine the progress they make in adopting the notion of ecosystem services. Our research questions are as follows:

- how is the notion of ecosystem services mobilized in the conservation policies in Costa Rica?
- what are the factors determining the adoption of ecosystem services notion in conservation policies?

Few researches have been undertaken to understand the way policies are shaped for incorporating and ruling ecosystem services and the barriers their leaders may encounter, especially in management of conservation areas. We hypothesized that the phenomenon of adoption of a notion by policy practitioners obeys to a conjuncture of factors stemming from legal, historical, institutional and cognitive registers. In addition, we postulate that this setting influences the way government bodies undertake *ad hoc* management of specific ecosystem services even though they are not recognized as such.

Drawing on the literature, we present a brief history of Costa Rica's conservation policies including details on the way ecosystem services were recognized. Then we provide first-hand qualitative insight of the dynamics of incorporation of ecosystem services notion into Costa Rican conservation sector. To conclude we demonstrate that the introduction of ecosystem services notion in the environmental sector does not constitute a rupture in public policies.

2. Material and methods: a social sciences stepwise protocol

Proceeding from political sciences and institutional change theories, we take up the public policies change in the sphere of conservation in Costa Rica as the result of a multi-actor process (Hermans et al 2009). We therefore identified the relevant actors with specific mandate in nature conservation and analyzed the relationships between them, recognizing actors' relative capacity to transform the sociopolitical structures (Muller 2005).

Drawing on the available literature, we studied the historical development of the establishment of the conservation sector in Costa Rica from the early 20th century. Then we carried out an in-depth analysis of the current mechanisms, institutions and policies set up in the conservation sphere in Costa Rica based on institutional documentation and scientific literature. For that, we looked at the institutions' genesis, legal and informal rules and governance. We collected information from technical, institutional and legal documents by

hand-searching on the web and by conducting fieldwork in the government agencies with specific mandate in conservation in Costa Rica.

Particular attention was paid to the current dynamics, obstacles and opportunities in the design and implementation of innovative instruments of public policies using the notion of ecosystem services. We realized a series of twelve semi-structured interviews with civil servants and officials with important technical or political mandate in conservation in Costa Rica (see appendix n°1). Two additional interviews were conducted with conservation leaders in the existing national NGOs. Those interviews were carried out from March to April of 2013. We combined this first hand information with other interviews realized previously with civil servants in the framework of the research project SERENA (environmental services and rural land use). To gain comprehensiveness in the methods, we undertook a snowballing sampling² (Biernacki et al 1981) along the fieldwork relying on a prior assessment of the main government agencies responsible of the current instruments of conservation (Protected Areas and Biological Corridors). We asked every respondent to indicate the persons that play an important role in promoting the notion of ecosystem services in conservation. We also built on the SERENA project experience of the relevant institutions and key individuals working in the field of ecosystem services. The interest of using snowballing methods here was to identify the latest strategies, projects, policies, initiatives and laws developed on our theme in Costa Rica and the persons involved. Each interview contained several set of specific questions. The first category of questions aimed to clarify the role the individual and its agency or institution played in promoting the institutionalization of ecosystem services. The second category of questions aimed to apprehend the actor's perception of ecosystem services. In a practical way, we asked the respondent's view of what the notion of ecosystem service stands for and why it is relevant or not relevant to consider them in conservation. The third category of questions aimed to understand the actor's experience and expectative on the way forward to promote more inclusion of the notion of ecosystem services in the instruments of conservation. This qualitative research protocol was intended to adequately capture the dynamics of diffusion of the notion within government agencies.

3. Results and discussion: disentangling multi-scale processes

3.1.A brief history of ecosystem services recognition in conservation policies in Costa Rica

² This method, also called chain referral sampling, consists in asking to the individuals interviewed what are the persons of interest for regarding the research one is undertaking.

Costa Rica's rich biodiversity registered tremendous losses during the 20th century. Indeed, the nation's choice of adopting a development model based on agrarian colonization (Brockett et al 2002) enhanced by infrastructures construction, in a context of demographic growth brought about a rapid wide-spread deforestation phenomenon (Rosero-Bixby and Palloni 1998; Evans 1999). By 1983, only the least accessible mountainous forest sloped terrains still contained relatively undisturbed forests (Sader and Joyce 1988).

Elaborating on Evans (1999) history of conservation in Costa Rica and the refined empirical material we collected during the interviews, we present Costa Rica conservation history in four periods with specific emphasis on ecosystem services recognition progress.

The first period (1969-1979) corresponds approximately to the seventies, where most of the national parks of Costa Rica were created (Brockett et al 2002). In response to great pressures on the forests by expansive agricultural development, a handful of leaders firmly engaged conservation issues and managed to obtain the attention of international NGOs such as British Corps or some bilateral agencies (Evans 1999, Moreno-Diaz et al. 2011). The first protected areas were built and managed on the model of the natural parks in the USA. Even though the notion of ecosystem services had not been conceptualized yet, the government was tacitly acknowledging the parks abilities to generate scenery beauty as revealed by the recognition of the convention of Washington in 1940. Nonetheless, the forest during that period was generally seen in government agencies as a reserve of wood for production purpose.

The second period (1978-1986) spans between the end of seventies and beginning of the eighties. It is characterized by a struggle to sustain the protected areas funding in a context of weakening of the central state due to the Latin American petroleum and debt crisis. The conservationists seek and successfully find good support from the three main international conservation NGOs, namely Conservation International (CI), The Nature Conservancy (TNC) and World Wide Fund (WWF). During that period the national assembly enacted a first law on wildlife conservation in 1983, giving precedent to the recognition of the ecosystem services related to hunting benefits.

The third period (1986-1996) starts in the middle of the eighties and ends up during the nineties and marks total change of paradigm of conservation, shifting from a "fence and fine" vision to a "human-oriented" vision of conservation. This change of paradigm is realized at the same time as a change of development model by the State which chose to prioritize

ecotourism. In addition in 1989 the national conservation agency (SINAC)³ is created as a single entity in the ministry of environment from the fusion of three state agencies under different ministries, namely the wildlife conservation agency⁴, the general forestry agency⁵ under the ministry of agriculture and the department of natural parks⁶. Its mission is to govern the country's network of protected areas. The national conservation agency's decentralized status and new mandate highly reflects this change of paradigm by promoting bottom up integrative approaches in protected areas management⁷. During the same year the national Biodiversity Institute is also created with the aim to inventory and promote sustainable use of the biodiversity of the country. The pioneers and main supporters of the human-centered paradigm start to build local scale experiences taking into account socioeconomic context in managing conservation instruments. Those key actors consist in a group of costarican executives working for The Nature Conservancy, the International Union for Nature Conservation (IUNC) and other international NGOs, some protected areas managers, certain higher civil servants at the national conservation agency and researchers from the Tropical Research Center and the National Biodiversity Institute. This in depth change of approach is cemented by the active exchange of all those experiences, changing at the same time the professional cultures. Put together, those changes make the ferment of the explicit recognition of ecosystem services within the conservation sphere.

The last period (1996-2013) is from the midst of the 90s up to date and deals with the enactment of the Biodiversity Law and the creation of the Biological Corridors, a new instrument for conserving biodiversity. First, the Biodiversity Law introduces a new integrative and vision of the forest as an ecosystem, breaking up with previous visions. Its objective is to "promote the adoption of incentives and retribution for the environmental services for the conservation, sustainable use and the elements of biodiversity" (Biodiversity law n°7788/1998, art. 10). It set up the foundations of new institutional mechanisms accommodating the ecosystem services provided by the protected areas. The ecosystem approach adoption is then strengthened with the national biodiversity conservation and sustainable use strategy in 1999 and is supported by mandate by the costarican biodiversity institute (INBIO 2013). It also facilitated the adoption of the MA ecosystem approach among

³ *Sistema Nacional de Areas de Conservacion*

⁴ *Division de vida silvestre*

⁵ *Direccion general forestal*

⁶ *Servicio de parques naturales*

⁷ The protected areas are managed by SINAC dependencies in different administrative units in the territory, each one at every scale being managed by committees including civil society actors as mentioned in the Law of biodiversity n°7788/1998

the other main institutions in the conservation sector; the national conservation agency, the Costa Rica por Siempre foundation (which administers the debt swap with USA for conservation projects), the Tropical Research Center (CCT)⁸, the Neotropica foundation, and the international agronomy and technology research center (CATIE) are among those. Second, the creation and officialization of the instrument of Biological Corridors allows an extension of the area under conservation and results from a 10 years multi-scale process between international and local actors. This process begins with the *Paseo Pantera* initiative at Mesoamerican level in the 90s, introducing the concept of biological connectivity between the countries. *Paseo Pantera* is officialized in the early 00s with the creation of the Mesoamerican Biological Corridor funded by German development agency (GTZ, former GIZ). The international institutions are also pushing countries members of the Convention of Biological Diversity to identify the biological corridors within their territories before 2006. Costa Rica complies with those lines by undertaking two successive assessments of its vacuums of biodiversity protection with the project GRUAS 1 in 1999 and the project GRUAS 2 in 2007. In the meantime, several local initiatives in Costa Rica are carried out for establishing biological corridors, partly benefiting from the small grants program of the United Nations Development Programme and Global Environmental Found, a supportive fund that started in 1992. According to the Biological Corridors program director, Costa Rica engaged in long-lasting procedures in the 2000s resulting in the formalization of the new instrument by decree in 2007⁹. Less robust than a law, this decree favored the implementation of a national program supporting and coordinating biological corridors initiatives in the regions. Interviews revealed that although the notion of ecosystem services is tacitly used by local actors, who favored ecotourism and water conservation initiatives, it played a minor role compared to the notion of connectivity in justifying the instrument creation at national level. Local Biological Corridors are still working today with the engagement of volunteers although they suffer from lack of funding.

Above all, this presentation highlights two principal elements that mattered in the adoption of ecosystem services into policies. First, conservation policies already implicitly addressed ecosystem services produced by the forest before the notion was created, although in a separated fashion. Second, the global change of paradigm that started in the 80s, introducing

⁸ *Centro Científico Tropical*

⁹ Decree 33106/2007

human into the field of conservation, prepared a favorable substrate to let ecosystem services notion attract conservation actors once it was elaborated.

3.2.Factors enhancing the adoption and diffusion of ecosystem services notion

Our empirical approach shed light on several factors that affected positively the adoption of ecosystem services notion into conservation policies.

First of all, we recall the prevailing international framework encompassing scholarship, international agenda and agencies promoting the notion of ecosystem services. Altogether, the CDB, the MA, the conference of Rio of 1992 and the mandate of IUCN are the main components of this background. It is noteworthy that the latter benefits from a privileged relationship with governments due to its innovative structure. The 12 principles of the ecosystem approach promoted by IUCN found strong adoption by CATIE in Costa Rica, showing how international agenda influences national level. However, postulating a general downward influence from international to national conservation policies is too simplistic since the biodiversity law of 1998 was adopting the ecosystem approach way earlier before it was adopted in the MA. Other works show that local and national actors can have an influence on international negotiations in the conservation sector (Corell and Betsill 2001). Hence the relationship between the two levels shall be considered as more dialectic than causal. Furthermore, the presence of the antecedents from the adoption of environmental services into a law¹⁰ by the forestry sector might have also influenced the conservation sector in a horizontal fashion.

Second, a multiplicity of actors at different levels is engaged in implementing grassroots pilot projects adopting the ecosystem approach in local contexts. Since 2007, the national conservation agency together with the CATIE, conduct a program for monitoring the ecosystem services in the protected areas, in the continuity of a pilot project carried out by The Nature Conservancy. This monitoring program assesses the management objectives of each PA and includes the ecosystem services among its indicators. Some regional branches of the national conservation agency are also proactive, for example the Caribbean office recently implemented an integrated ecosystem management plan in a participative way. Also, the

¹⁰ Forestry Law 7575/1996

national Biodiversity Institute has set up a pilot project called socioecological management units (USEG) in two northern regions of the country, planning the implementation of new mechanisms internalizing the ecosystem services generated by actors on the territory. The USEG are drawn in the continuity of another pilot project undertaken by Conservation International focusing on ecoregional management in 2002. In addition, the Tropical Research Center is also testing the MA ecosystem approach in managing the protected areas under its jurisdiction (particularly the Monteverde and Los Cusings biological reserves and the San Juan de la Selva Biological Corridor). Many initiatives were undertaken by the international NGOs present in Costa Rica since the 80, particularly the World Wide Fund, The Nature Conservancy and Conservation International, generating long lasting learning outcomes for national and local actors. Other experiments are underway, for instance a specific label internalizing the ecosystem services generated by small and medium companies located within biological corridors. However, policy science demonstrated that pilot projects or particular programs only reflect minor political changes without necessary impact on the overall system (Müller 2005).

Finally, an important change of vision of conservation toward the inclusion of the human-ecosystem approach was influenced by the presence of international NGOs. In practical, those NGOs hired Costa Rican executives that were formed in the United States and became active leaders in promoting ecosystem approaches.

We identified three factors that enhance the adoption of ecosystem services notion into conservation policies.

- A dialectic influence between national and international levels including a rich set of institutions and programs promoting ecosystem approach
- A multiplicity of pilot projects at grassroots level engaging national and international actors
- A presence of key active experts and promoters of the notion originating the design of those pilot projects.

3.3.Barriers to the adoption of ecosystem services in conservation policies

Nevertheless, many obstacles hinder further diffusion of ecosystem services into scaled-up policies at national level.

Firstly, complementarities between international and national actors are important. National level organizations lost a great technical, political and financial support from the international conservation NGOs that had been very active in Costa Rica since the last decades. Indeed, The Nature Conservancy, the World Wide Fund and Conservation International, the main three international conservation NGOs in Costa Rica, operated at the same time a strategic redeployment of their zones of intervention, privileging other countries than Costa Rica since its environmental and human indicators improved a lot. Moreover the national organizations budgeting power has been shrinking, for example the national Biodiversity Institute faces challenging financial constraints today and many pilot projects suffer from limited funding.

Second, there is a lack of problematization linked to the role of the notion of ecosystem services in the governance of conservation sector in Costa Rica. This is revealed by the reluctance of legislative bodies to update the conservation legal framework. Indeed, various respondents from the national conservation agency lament the absence of application decree to engage in the implementation of the content of the biodiversity law of 1998. This would give real mandate to the national conservation agency civil servants and protected areas managers for engaging into ecosystem management approaches. Those results suggest that conservation is not the current affair in costarican legislative bodies as it is not triggering broad public debates in Costa Rica.

Third, legal barriers and a path dependency hinder any change in the governance of protected area wanted by the most proactive civil servants in the government. The national conservation agency benefits from an unprecedented governance structure allowing very strong citizenship participation at every level, from the management of conservation areas to the national boarding committee. This strong bottom-up rationale might give favorable ground to implement ecosystem services approaches in managing the protected areas, reconnecting decision making to local society, which is directly concerned by the ecosystem services generated within and around the protected areas. Nevertheless, according to a civil servant of SINAC, this organization has been “hand-cuffed” since its creation in October of 1995 in each attempt to implement this participative and integrative approach in governing the protected areas. This institutional inertia stems in two conjunctive factors which are still operating today. On the one hand, the government of Costa Rica historically follows a highly centralized institutional model, decision making being concentrated in the highest ministries. Hence, the sudden creation of the national conservation agency and its innovative structure on the basis of three government agencies formerly centralized provoked a lot of defiance both

internally, within its hierarchy, and externally, the agency being seen as an “absurdity” within other ministries. This institutional path dependency generates centralist pressures influencing the officials’ demeanor. On the other hand, at the moment of its creation, it was found that the conservation agency’s legal status, due to its highly participative content, was unconstitutional. Consequently, the ministry of environment in function in 1995 (Elizabeth Oduo) appealed the constitutional court to cancel the agency’s legal status, creating a *status quo* which is still in vigor today. Those centralizing pressures became even more evident with the failure of a project carried out by the GEF aimed at solving the conservation agency legal status issue. This failure to effectively decentralize conservation has also been noted by Basurto (2013).

Fourth, the implementation of successful integrative ecosystem management approaches requires to overcome single government agencies mandate and to find suitable complementarities between them (Ranganathan et al 2008). The implementation of ecosystem management principles is hampered by cross sectorial legal inconsistencies. The forestry law of 1996 and its jurisprudence recognize every forest as State asset. Therefore its rigidity makes more complicated any intend to implement genuine participative ecosystem approaches. Ahead of legal contradictions, cross sectorial issues are also materialized in the institutional interplay. There is a lack of coordination between agencies due to the difference of their mandate, vision and professional culture, encouraging rivalry and sectorial interest seeking behaviors. For example, the Costa Rican Electricity Institute (ICE)¹¹ refused to communicate its infrastructure plans to the persons involved in the inception and realization of the project GRUAS 2 at the national Biodiversity Institute. Those results illustrate that intersectorial coordination occurs at legal as well as institutional levels.

Fifth, institutional trajectory, lack of competitive salaries, lack of emphasis on ecosystem services in the curriculums, incompatible professional cultures and paradigms are among the drivers that impede further diffusion of ecosystem services notion into the national conservation policies. The way cognitive and cultural drivers proper to specific institutions influences civil servants behavior in the conservation sphere matter. Historically, the national conservation agency was assembled “by force” in October of 1995 from the merging of three distinct organizations with their own particular vision and working cultures; the forestry agency (DGF)¹², the wildlife agency (DVS)¹³ and the national parks department (SPN)¹⁴. In

¹¹ Instituto Costarricense de Electricidad

¹² *Direccion General Forestal*

fact, there has been no replacement of the officials and civil servants who suddenly had to work altogether. Particularly, servants coming from the forestry agency tended to keep a vision of forests as a resource that ought to be managed by the State for production purpose; whereas servants formerly in function in the national parks department tended to keep an exclusive vision of conservation (the “rangers” vision consisting in protecting conserved areas from any human influence). Furthermore, this particular institutional trajectory also affected resources capacity at the national conservation agency. Most of the staff coming from the three merged agencies was experts in biophysical and ecological domains whereas almost no one had background on the socioeconomic, anthropologic or cultural dimensions of conservation. This inadequacy between the conservation agency’s human capacities and its mandate seriously hampers intents to take up ecosystem services approaches in governing protected areas. One could object that the upcoming new generation of ecologist recruited in the government will present more sensibility to innovative frameworks and change the balance in favor of more incorporation of the ecosystem services. Nevertheless, our interviews showed that few national universities include ecosystem services in their curriculums. Again, the dominant perception among universities lecturers is that ecosystem services are no more than an international fashion. Another missed opportunity lies in the lack of competitiveness of government salaries to recruit experienced staff in ecosystem services domain. After the international NGOs stepped down and froze their activity in Costa Rica, they released a group of Costa Rican experts who gathered valuable know-how on ecosystem management. Those executives, rather than integrating the government, preferred to find other placements abroad in other international NGOs. This shows that the role of mobile experts behind the NGOs with fluent circulation from one organization to another revealed by Hrabanski et al (2013) can easily stop further policy innovation spreading instead of enhancing it.

The way ecosystem services are perceived among actors is also critical, particularly since the tension between strict and human-oriented visions of conservation still divides the conservation sector. Our interviews also showed that the two main national NGOs involved in biodiversity conservation (FECON¹⁵, Co-ecoceiba) are not interested in the topic of ecosystem services. They rather tend to advocate for stricter conservation, denigrating the organizations supporting a more human-oriented conservation. Those NGOs consider that

¹³ *Division de Vida Silvestre*

¹⁴ *Servicio de Parques Naturales*

¹⁵ FECON : *federación conservacionista de Costa Rica*

valuing ecosystem services in the protected areas would give stronger arguments to the companies which seek an access to the natural resources (hydric energy and geothermal resources) within the protected areas. Overall, the defiance toward ecosystem services identified among practitioners might stem from the lack of certainty that ecosystem services can actually provide more argument to keep areas protected. Indeed, Ghazoul (2007) identified several cases where the ecosystem services provided by natural parks could easily be replaced by a technological change, for example the appeal to private beekeepers for pollinating trees in the case of plantations in USA. Apart from this, there is a coexistence of the notion of ecosystem services with the notion of environmental service which are selected and sometime misinterpreted by local actors, who tend to prefer one to each other for pragmatic as well as idealistic motives. For example, some local experts support the notion of environmental service at the detriment of the notion of ecosystem services, claiming that environmental services notion is more likely to reach the main public. Another example is the way certain actors realized an amalgam between biodiversity and the ecosystem services it provides. This suggests that the integration of a notion into a policy field always subject to re-interpretations by different actors leading to public debates over its normalization, as demonstrated by Fouilleux (2000) and illustrated by Valette et al (2012) in the French agricultural sector context.

In sums, a set of constraining factors influenced the institutional trajectory taken by national conservation agencies, hampering further integration of ecosystem services notion.

- The lack of ideological, financial, human and technological support from international actors, which follow their internal logics and strategies
- The lack of urgency of the problem related to ecosystem services notion in the public debate
- The inadequacy between official's mandates and the capacities, traditional culture and cognitive characteristics of its civil servants
- The contradictions between mandates, visions and sectors legal frameworks
- The cross-sectorial and legal and institutional pressures
- The reluctance of States with a centralist tradition in effectively developing bottom-up and participative approaches involving humans in protected areas.

4. Conclusion: an unfinished transfer of a notion

Addressing the lack of integration between ecosystem services-related scientific knowledge and decision making at policy level, we carried out an empirical study of the integration of ecosystem services notion as realized by practitioners in Costa Rica's conservation sector. We successively presented to what extent ecosystem services have been taken into account into conservation policies in recent history, followed by the current factors affecting in a positive or negative way the process of adoption of the notion.

We evidenced continuity in conservation policies historical structure. No major policy change was triggered despite the shift from one paradigm to another and the inclusion of ecosystem services notion into institutions' rhetoric. In a practical way, ecosystem services notion was rather utilized to renew the justification for the instruments of conservation with few large-scale changes on their governance.

Hence, the integration of ecosystem services notion into conservation policies remains unfinished. The departure of international NGOs, the legal contradictions, the cultural and cognitive tensions in the government agencies hamper further policy innovation for now. However, policy change is a long lasting process and new challenges are offered to the conservation sector and the government to orientate future policies.

However, the continuity identified in the policy process is far from being a simple business-as-usual scenario. We demonstrated that actors are entangled single agencies in following their vision and strategy, confronted with plural and multifaceted constraints and opportunities.

Finally, our results tend to support Ghazoul (2007) argument that ecosystem services notion incorporation into institutions obeys to sociopolitical and cognitive factors rather than pure opportunity costs calculations. Furthermore, we consolidated with empirical basis Laurans et al (2014) statement that political decision making involves multiple registers including history, culture, politics and psychology.

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Appendix 1: interviews sampling

Institution	Informant's position detail	Interest in the study
CATIE		
	Chairmanship of the department conservation areas and biological corridors "Kenton Miller".	Experience in biological corridors and conservation areas management
INBIO	Director of development	Supervised the projects GRUAS and GRUAS 2 on conservation vacuums
INBIO	Biologist	Involved in the debt swap for INBIO.
INBIO	Biologist, USEG Project manager	Has in-depth knowledge of the making and implementation of USEG project
PNUD		
	Director of the PPD (small grant program)	Participated to the creation of the national program of biological corridors (PNCB) and funds conservation projects within biological corridors
SINAC	Coordinator of the PNCB	Steers and monitors the PNCB and the national network of biological corridors
SINAC	Tortuguero conservation area director	Headed the creation of the PNCB decree, worked as expert in The Nature Conservancy conservation projects in Costa Rica
SINAC		
	National coordinator on research and monitoring	Undertook integral conservation projects, formulated the ecological monitoring, integrated the national commission on biodiversity, worked as representative for the commission of protected areas in the Centroamerican commission for agriculture and development, worked as spokes person for UNESCO

CATIE		
	Researcher, director of the sustainable forestry deparment	Participated to the elaboration of the evaluation protocol of biological corridors
FUNDECOR	Executive director	
		Worked as expert in The Nature Conservancy and PNUD, implemented a conservation project in La Amistad national park
CATIE		
	Researcher in biodiversity and ecology	Participated to the elaboration of the evaluation protocol of the biological corridors
<i>Instituto de políticas para el desarrollo sostenible foundation</i>	Executive director	Carried out ecosystem services valuation studies in Costa Rica for the government
CCT	Executive director	Implements innovative programs on protected areas management
FECON	Representative member of the commission for SINAC	Offers overview of the national NGOs perception of ES

Source: authors' elaboration